

Pacific Discovery

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IN THIS ISSUE: William Beebe

Olaus J. Murie • Robert T. Orr • Robert Cunningham Miller

Earle G. Linsley • A. Starker Leopold

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A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

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Pacific Discovery

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Pre-Discovery:

In the next issue PD will explore the southern California desert with a reptile hunter. Crossing the border into Mexico via the letters and journals of an itinerant collector-naturalist, PD begins a random series of notes from the field, of interest to all who plan to travel here and there in the world of the Pacific—tourist-wise or, especially, otherwise. Looking literally into our own backyard in Golden Gate Park, an Academy staff ornithologist discovers a fascinating bird population. There will be coconut crabs, and other matters. And the Editors hope for enough letters from readers to start reserving a page to print them on, beginning next issue.

Discovering PD's Authors:

Introducing **William Beebe** here in words is almost an affront, both to one standing so high among living representatives of a Great (and passing) Age of naturalists, and to many of his readers—those, at least, to whom a book by Beebe is, perennially, their favorite natural history reading. Nevertheless, the Editor feels that a word about Dr. William Beebe, Sc.D., Director of the Department of Tropical Research of the New York Zoological Society since 1919, will bring into closer acquaintance with him as scientist those few others who have merely heard of "Beebe"—the man who went down in that—what was it—bathysphere? For Dr. Beebe is first and last—almost fanatically so to those of us who have worked with him—a searcher for truth about living beings, the mysteries of their lives and their origins on this teeming earth. And all he asks to work with, we've heard him say, is a bit of jungle, where earth's life reaches its incredible climax. The substance of "Hummingbirds of the Mist" will appear in his forthcoming book, *High Jungle* (Duell, Sloan & Pearce, 1948).

No one could write with greater conviction or authority about the Jackson Hole and Grand Teton country than **Olaus J. Murie**, Director of the Wilderness Society, whose home, Moose, Wyoming, is in

Jackson Hole itself. His long career as field naturalist and biologist has included many years, devoted to knowledge and conservation of animal life, with the U. S. Fish and Wildlife Service.

If it's bats you want to know about, ask **Robert T. Orr**. As Curator of Birds and Mammals at the California Academy of Sciences, and Assistant Professor of Biology at the University of San Francisco, Dr. Orr could—and will in later articles—tell us a great deal about our North American fauna. The Academy will publish, in 1948, Dr. Orr's new book, *Mammals of Lake Tahoe*.

To list the committees concerned with natural resources problems of which **Robert C. Miller** is member or chairman would fill a column, at least. Besides being Director, for the past decade, of the California Academy of Sciences, Dr. Miller is, for instance, Chairman of the Technical Advisory Committee on Sardine Investigations, composed of representatives of the U. S. Fish and Wildlife Service, the California Division of Fish and Game, the Scripps Institute of Oceanography, and the California Academy of Sciences. When solutions to the "Mystery of the Disappearing Sardine" begin to loom out of the Pacific Coast fog, Dr. Miller will write the sequel to his story.

Dr. **Earle G. Linsley**, lately Director of the Chabot Observatory, now the Academy's Research Associate in Astronomy, will, during the year, tell PD's readers about the Planetarium for which the Academy will soon break ground, and keep them in touch with progress atop Mt. Palomar as the Giant Eye nears the date when it will first see the light of unknown stars.

Conservation is a tough and touchy subject. Dr. **A. Starker Leopold**, PD's Conservation Editor, whose title at the University of California's Museum of Vertebrate Zoology in Berkeley is Assistant Professor of Zoology and Conservationist, is young, tough-minded, and knows his way around in field and stream. Those who would take issue with him—they are hereby invited to do so—will find him "loaded for bear and ready to fight."

D.G.K.

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD



Edge of the Pacific. Bishop pines, Mendocino County, California. (Photograph courtesy of the Redwood Empire Association)

EDITORIAL

THE LAUNCHING of a magazine, like the launching of a ship, is an event that should not pass without remark. The two occasions in fact have much in common. Both require careful planning, a long period of construction, considerable thought about the type of cargo to be carried, and the selection of a suitable name. Both are likely to inspire editorial comment, with quotations from the poets. Each creates a state of mounting excitement and tension, as those responsible ask themselves whether the proud vessel about to slide down the ways will ride easily upon the swell, or show some hidden defect of design.

It is best not to push a simile too far. A ship is commonly christened by smashing across its bow a bottle of champagne or other liquid. We know of one vessel that was christened with water carefully collected from the seven seas. However romantic and even appropriate such a gesture might be, we cannot recommend it for the launching of this magazine. In the absence of any substantial prow of wood or steel, the only available target for bottles or other solid objects would appear to be the Editors. They are willing to forego the ceremony.

Do not think, however, that the matter of christening has not had earnest thought. Nothing was more frequently or lengthily discussed by the Editors than the choice of a name for this journal. Of some fifty names suggested, the one that gradually emerged as everyone's preference was "Discovery," a word the Editors liked in its own right, and further because it was the name of the ship with which, along with the "Resolution," Captain Cook explored the Pacific in the eighteenth century. However, there is a well-known British scientific publication called "Discovery." And while it is not without precedent for two magazines published on different continents, or even in closer geographic proximity, to bear the same name (one name briefly considered was found to have been used by eleven periodicals, eight of them in the United States!) the Editors preferred to avoid any likelihood of confusion. Hence, with a salute to our distinguished British predecessor, we have added a qualifying word indicative of the direction in which we plan to chart our course, and have placed at our masthead PACIFIC DISCOVERY.

Not that we promise to stay strictly within implied geographic bounds—as witness this first issue in which, with Dr. William Beebe and his "Hummingbirds of the Mist," we stray immediately to the shores of the Caribbean. But our primary concern is to meet the need we believe exists for a magazine placing its emphasis on the natural his-

tory of the Pacific Coast and the Pacific Basin—including, not irrelevantly, anthropology, human biology, certain aspects of the physical sciences, and other matters we judge to be within the bounds of our readers' interest. High among our aims also is to urge the intelligent conservation of natural resources and natural beauty, that through wise use they may be permanently preserved as a priceless heritage.

Even if we were to hold ourselves to the literal meaning of "A Journal of Nature and Man in the Pacific World," we should not feel circumscribed. The Pacific Basin is 10,000 miles across at the equator and, with the lands immediately contiguous, constituting the so-called Pacific Rim, occupies fully half the globe. This Pacific hemisphere, moreover, so long an Ultima Thule of story and romance, has shifted in much less than a decade from the periphery to the center of world interest and world affairs.

Civilization—at least the civilization we know—has moved ever westward, from the Aegean to the Mediterranean, to the Atlantic, to the New World, and now to the world of the Pacific, where it meets and mingles with other cultures, some far older than itself. Good Bishop Berkeley discerned the trend two centuries ago when, after visiting Colonial America, he wrote, "Westward the course of empire takes its way." Tennyson expressed it better through the person of the aging but dauntless Ulysses:

Come, my friends,
'Tis not too late to seek a newer world.
Push off, and sitting well in order, smite
The sounding furrows; for my purpose holds
To sail beyond the sunset, and the baths
Of all the western stars, until I die.

That Tennyson had more in mind than geographical exploration and physical adventure is clear in two other lines, in which Ulysses voices yearning

To follow knowledge like a sinking star
Beyond the utmost bound of human thought.

The scientist, speaking generically, knows certain things that only science can explain, he also knows—or at least is deeply aware of—certain other things that poets understand and can explain better. It is this second type of knowledge—shall we call it insight?—that keeps him interested in the first, and gives meaning to his work.

In the true spirit of intellectual adventure we invite our readers to join us on this first and many subsequent voyages of PACIFIC DISCOVERY.

R.C.M.



WILLIAM BEEBE

Hummingbirds of the Mist

THE TIME WAS SPRING in the subtropics of north-central Venezuelan Andes. The place was Portachuelo Pass, a half mile above the sea, looking north eight miles to the Caribbean, and twenty miles south to Lake Valencia. Two hundred yards down the jungle road was Rancho Grande, that great half-finished castle which was all our own, thanks to the kindness of the Venezuelan government and the Creole Petroleum Corporation. In every direction stretched the incomparable cloud forest, with its mighty jungle trees festooned with air-plants, moss, and orchids.

Here, immobilized by a cast on a broken leg, I sat at the head of a great gorge and waited.

The distant Andes to the west were draped with neblina, or perhaps clouds were the better term today, but the air at my level was quite clear. The gorge was filled with translucent haze, so nebulous that only the early rays of the sun pouring down made it visible. The effect was of a great shaft of luminosity, focused at the bottom of the deep valley. Where usually particles of dust would have made the rays visible, here only separate drops held in suspension materialized the air. The solar searchlight was directed to the floor of the jungle, and instead of the real color of saturated green, the herbage was yellow above, then distinctly orange, bluish, and violet. As in shallow

*Limón Valley and Lake Valencia
from the roof of Rancho Grande.*

depths in the ocean, red, for some reason, seemed absent. While I watched, the spectrum rose from the leaves and formed a real rainbow, a circle of color like that seen from an airplane, hung in mid-air, part way up the gorge.

Twenty minutes later when I looked again, the old earth had turned on its well-oiled axis and the focus of light had shifted to a clump of melano-stomids in full flower, but now they were not white but strongly yellow-gold. Some alchemy of sun and warmth and all the complex things which make scenes change, drew the neblina up and past me, like the drapery of restless spirits, and the rainbow went where all rainbows go. As the mist swept along, shreds and tatters were torn away and found lodgement in casual places, making manifest other hidden things. Hosts of spiders had hung invisible strands of web, draped in spirals or circles or tapestries and portieres of innumerable tented strands, binding twigs and leaves. All of these attracted infinite numbers of beaded drops, and in the path of the moving mist all these secret traps set for unwary small-folk were shorn of privacy and became for a time the most conspicuous of scenic props. The jungle of the gorge was spangled and splashed with an infinity of silver wheels, cones, triangles, octagons, and spirals.

I shifted to number sevens, rested my glasses on a crooked branch and scanned the foliage far below me. What drew and held my attention was the shadow of two slender leaves, which swung back and forth. This is a common trick of the jungle, for one or several leaves to begin to move while there is yet not a breath of air in any direction. But these leaf shadows now swung in a circle, and even self-propelled leaves do not do this. I shortened my focus and there came into clear vision one of the loveliest beings I have ever seen. On a tiny bare branch, against a setting of pendant moss and spires of air-plants was a hummingbird. Tail included, it was well over half a foot in length and was making its early morning's toilet. This it continued to do for twenty minutes and not a single plume of the hundreds on its body seemed to escape preening and rearrangement. As it bent its head, a gorget heliographed a ray of sheer emerald glory straight into my eye. Its back was dark but still intense green. Then came short tail feathers of blazing steel blue. Beyond, there sprouted longer and longer plumes, all glorious bronze and greens, and finally two elongate slender feathers of iridescent spectrum violet, whose

wavering shadows had first caught my attention. By the time my eyes had recorded this splendor, the bird shook itself, rose gently with no effort, revolved slowly in midair and settled again in reverse position. Strain as I might, my naked eye showed no hint of this living rainbow against the lights and shadows of the jungle tree so far below me.

Unexpectedly a small, definite, swift-moving cloud rolled up the Gorge Trail and enveloped me in its damp embrace. For a few seconds I might have been far out at sea or high in air. Then it began to thin and with a loud hum a lovely bronze-tail materialized directly in front of my face, glowing with oxidized iridescence, hanging in midair, and competing with the gray swirl of hot and cold air in the Pass by stirring up, with its whirring wings, a minute personal hurricane of its own. This bird was a female, exquisite but less flamboyant than its mate. The green back was set off

Photographs by Jocelyn Crane



*Neblina (fog) swirling through
Portachuelo Pass—zone of the
racket-tails.*



Tree-fern perch of the bronze-tail.

by a striped throat and white facial streak, lower plumage tinged with warm cinnamon and tail white-tipped.

Feeding on the coral and white melanostomid blossoms above me, near the top of the mound, were five bronze-tails, three of them females. The last skeins of neblina sank into the underbrush and the quintet of birds put on a show which left me breathless, and ashamed in my heart to attempt to describe.

Almost immediately the two males left their feeding, hovered face to face overhead, and with a lightning swoop one struck the other so forcibly that it appeared stunned. The fluff of feathers fell

flutteringly, almost out of control straight down toward me, and instinctively I cupped my hands to catch it. A yard away it suddenly recovered, righted itself, and flew straight off along the ridge. Later it appeared twice but refused further combat when threatened by the first male.

Now began a special performance and if only my earnest wishes were omnipotent the whole Pass would have been filled with all my appreciative friends. Again and again the male hummingbird displayed to two of the females in succession. The latter frequently left their flower feeding and perched on individual twigs, bare and exposed, about ten feet apart. The male bird would hover directly in front of one female with his tail spread so widely that it formed a semicircular fan of fire-opal. Whenever I moved, ever so slightly, within a fraction of time the multi-emoted hummer left his courting and swooped at me. He brought up about eighteen inches from my face, quivering in midair, in a roaring aura of gleaming emerald, blue, and violet. Now and then he uttered a sharp *tsip!* at me, perhaps a "Be quiet, You!" although he had used the same note when he assaulted his feathered rival. I was flattered at thus being included in the family affair and I obeyed, freezing into immobility. The bird returned to the object of his frenzy and reassumed the frontal hovering.

Then came the second phase, a slowly accelerating pendulum swinging from side to side, through an arc of about one hundred and twenty degrees. The first spasm numbered twelve double swings, then the second female was favored with three separate acts, the third a terrific explosion of lateral flicks, running into several score, with an instantaneous whipping and snapping back at the moment of highest point of the arc. The wavering tail feathers thrashed until I thought to see them torn out and flutter to my feet. The third female was a wall-flower throughout, attracting no attention from the male, but refusing to leave the scene, and apparently happily preening and feeding with the rest.

The final frenzied dervishing back and forth took place in a charming setting, female number two having chosen a new stance among a mist of white blossoms of a climbing begonia which cascaded for twenty feet down the trunk of a small palm. I started to write the details of this display when between the leaf of my note book and my eyes, there abruptly began an encounter in midair between two minute, yellow-banded hover flies.

The battle was equally ferocious and of longer duration than that of the male hummers, but on a scale of size as far below the birds as they were beneath my own dimension. Quantum of emotion is not concerned with the bulk of its possessor.

Quiet finally and suddenly ensued in the realm of hummingbirds; all excitement came to an end, and all five had no other interest in life but the contents of the long tubular flowers comprising the nectar and insect bar.

While the dozen or more species of hummingbirds which I observed at Rancho Grande vary widely in color, size, specialization of bill and tail, and in other ways, yet there is one thing I observed in all and which I have never noticed elsewhere. This is a pronounced tendency to eliminate the typical hovering in feeding. Perhaps the most characteristic thing about the activities of this order of birds is their balancing in midair, moving up, down, forward, back, or around with equal ease, dipping into flowers for nectar or more usually for insects, or picking the latter from leaves and other growths. But the hummers around Rancho Grande, whether the big bronze and racket-tails or the tiny crimson-throated wood star, more often than not, alight, especially when the flowers and leaves are close together, and clamber and push about. Like chickadees they often cling upside down, they scramble with wings and feet through festoons of moss or between collars and petals, giving the impression at times of being half crippled, so weak and small are their legs and feet. Their plumage appears damp and disheveled, they alight on the rim of slender, tubular flowers and push bill, head, and neck so far down that I fear, again and again, that they will be unable to withdraw. Whether or not due to the density of the damp vegetation and inflorescence of Rancho Grande and Portachuelo Pass, the various species of hummingbirds have developed a frequent method of feeding wholly alien to that of their fellows in other parts of the neotropics. Day after day, week after week this peculiarity would be evident and result in dozens of chronologically unconnected field notes.

A second species of jungle hummingbird was the racket-tailed, formally known as *Ochreatus underwoodi polystictus*. When I first saw it I recalled my boyhood reading of Bates and Wallace, for the lengthened, wide-curved outer tail feathers with their long, bare shafts and the terminal feather rackets seemed always to epitomize exotic

bird life so unlike anything in our home woods. I found these equal in numbers with the bronze-tails and after courtship and when serious nesting began, both species neatly aligned themselves on opposite sides and slopes of Paraiso Trail leading up to the west from the Pass. The bronzes were all to the north or gorge side, while the racket-tails located to the south, where, in the far distance they could overlook Lake Valencia. There seemed no enmity between the two species, but when a male hummer intruded on the staked claim of another of his own kind, anger gave place to rage, and frenzy to schizofrenic fury, as the outraged owner vented his *Tsips!* and almost burst with emotion backed with lightning attack. Yet there were nomans- or nohummersland extraterritorialities where both associated and fed in amity, the while their women folk brooded the tiny ovals, almost too small to be called eggs. When the females left to feed they were quite taboo from attack, and flew unmolested where they would.

A favorite gathering place out-of-bounds-of-battle was a group of unknown shrubs, whose florescent color changes were prismatic. The first appearance of the flowers was as small, slender, creamy-white buds. These grew and developed bract-like affairs of rich crimson. Out from these in turn shot the flowers proper, lovely, tiny, blue-and-white stars, shining in the jungle dusk. The second day of blooming they turned an equally brilliant golden yellow. Finally the fruit was exactly like intensely hued blue-berries. There was no stage in all this sequence when the hummers failed to find an abundance of insect fodder, attracted first by a sweet gummy substance, then nectar and honey, followed by pollen, and fly-alluring azure berry juice.

When the Heliconias were in full bloom they were fishpools, drinking fountains, and swimming holes for the hummers. When a racket-tail in all his glory perched on the rim of one of these enamored rose, green, violet, and golden aquariums, daintily choosing from among the swimming schools of water life, the color combination left one breathless.

Then as if to show the unlimited skill in their various methods of feeding, a female would leave the flowers and drift effortless as a shadow, from web to web, plucking off the spider from the center of each, without causing a break or even a vibration. Finally she would again return to the Jekyll-and-Hyde shift, to her awkward scrambling



Portachuelo Pass jungle. Dr. Beebe and fellow-scientists record with the camera life of the jungle floor.

assumption of erect, half prone, and inverted positions among the dense moss and massed blooms.

The racket-tail male has a special courtship routine unknown to the other. He would perch in front of a female and repeatedly raise his wings, slowly and evenly, until they met over his back, then lower and close them. With each uplift, the tail, as if connected by some wire or string gadget, would simultaneously spread wide full ninety degrees or more, the rackets quivering in midair like independent sentient structures. These hummers also had the pendulum performance, the sound of the wings wholly unlike that of the bronze-tails, rising to a diminutive roar at the upswing.

In the midst of the acme of masculine emotion the unimpressed object would occasionally seem to remember that she felt a pang of hunger, dart to the nearest flower cluster and begin to creep and crawl, without skill or grace, ruffling up her feathers in her efforts to snatch an insect here and there. Then tumbling into an open space, she would rise lightly as a thistle down, and begin to pick invisible gnats from the transparent air, plucking them from space like a magician, with no need of swallow swoop or flycatcher snatch.

We hung a series of glass honey sippers along the ridge trail to bring the hummingbirds more often under observation. Ants and wasps found them first, but the hummers knew their rights and not only drove away the wasps but misunderstood and fiercely resented my efforts at insulating the sippers from ants by means of greased wires. Once having sampled them, the small birds assumed possession, and when I approached a sipper within their particular territory they fought me as they would any intruder. Yet away from this manna they paid no attention to me. The sipper and the nest were verboten. Again we could observe the niceties of boundary, and the sipper over my seat at the head of the gorge trail was neutral, common property. From this saccharine pub any rival, or even I myself, had I wished, could sip in peace.

A squirrel hurled profane billingsgate at me, *Chuck-a-chuck-a-chuck!* Occasionally he would choke with rage, and seem to swallow and gulp in the middle. *Wop-gurgle-chuck-a-chuck!* Very often no creature paid any attention to this uproar. The squirrel had cried wolf too often.

Sounds sometimes creep up so gradually that consciousness perceives them almost before the

ear. When the squirrel at last ran out of invective and breath I was aware that the air still vibrated; it seemed filled with a faint fog of sound, a dimming of the silence. Finally a sudden distant bark awoke my ears and I realized that I had been listening, without knowing it, to a band of howling monkeys, so far away that it had not sufficed to break into its rightful sense until now.

This ceased and was replaced by a high, sweet wire of sound. I listened intently and at last looked up and saw a hummer—a male racket-tail—perched on a twig, his mandibles parted and his whole little being vibrating with the effort of song. No *tsip* this, but a charming song, as real as that of any hermit thrush or nightingale. I sat with my lips slightly open, the way I listen to Wagner, until the song ceased, or so it seemed to me. Yet his bill was still open, his frame still throbbing, his infinitesimal eyes closed as in ecstasy. Again my fallible senses were at fault—the song had not ceased, it had merely risen a few tones into vibrations too refined for a human ear. As I considered this, lower phrases began, and the thin audible thread once more came to me. Howling monkeys three miles away, a racket-tail as many yards! How grateful I was for at least the narrow band of audibility vouchsafed us in this grand world.

Hints of a dozen other phases in the lives of these birds were too brief and inconclusive to at-

tempt to elaborate at present. Just one comes to mind, a battle royal between two racket-tail males, which ended decidedly and permanently in victory for the one which had lost one of his decorative tail rackets, as well as being disfigured by a missing patch of breast feathers. Question: What value in courtship and rivalry, love and war, is possessed by these and other secondary sexual characters?

After becoming acquainted with the long-tailed hummingbird in the Pass, I later found in the laboratory a neat skin of his kind in my box of birds borrowed from William Phelps. In the sunlight the dead feathers gave forth a burst of brilliance, but the neck was stiff and outstretched, the eyes were of cotton, the feet were neatly crossed in death and fastened with a rectangular epitaph.

The life, the habits, the ways of living creatures are the things which absorb us in the jungle beyond all this. But except by signs, by pointing, by dumb show, all our efforts would be a total loss without a verbal handle, a name, a vocal sound to indicate this and that form of living being. Of such names there be two general sorts, one to be used by Tom, Dick, and Harry, but wholly incomprehensible to Pedro, Ivan, and Chang (and vice versa). The other is the Latin or Greek bi- or trinomial, such as we find inscribed on the above mentioned rectangular epitaph label, and which



brings a sparkle of understanding to the eye of an intelligent ornithologist of whatever nationality. Etymological curiosity concerning the evolution of these terms often brings us up against a barren unimaginative avian Adam; or again it may unearth humor, emotion, culture, even inspiration.

Let us consider our long-tailed hummingbird (small caps. as indicating mere description), and confine ourselves to the English tongue. Also we will reverse the usual procedure and deal first with the vernacular. To our astonishment, we find even the God of Priority on our side, because the first English-speaking man to write "humming bird" did so one hundred and twenty-one years before the earliest permissible scientific name was coined, which was *Trochilus*, by Linnaeus in 1758.

It was the diminutive size which prompted the first notation, but the sound of the wings in flight which suggested the name. The first use, as far as we know, was in 1637, in an account of the birds and other matters of "New England Canaan or New Canaan." It was penned (or quilled) by Thomas Morton of Cliffords Inne gent, and his words are as follows:

There is a curious bird to see to, called a humming bird, no bigger than a great Beetle; that out of question lives upon the Bee, which hee eateth and catcheth amongst Flowers: for it is his Custome to frequent those places, Flowers he cannot feed upon by reason of his sharp bill, which is like the poynt of a Spannish needle, but shorte. His fethers have a glasse like silke, and as hee stirres, they shew to be of chaingable coloure: and has bin, and is admired for shape colour, and size.

Twenty years later in tropical Barbados, Mr. R. Ligon adds little that is new to our subject but that in different words: "That which we call the humming bird, much less than a Wren, not much bigger than an humble Bee . . . never sitting, but purring with her wings, all the time she stayes with the flower." One more quotation tempts me as it is in rhyme, by Alexander Pope in 1742:

Yet by some object ev'ry brain is stirr'd;
The dull may waken to a humming-bird.

Bird observers of other nationalities have had other thoughts in naming these little creatures, hence such terms as oiseau-mouche and honigsauger. In their Venezuelan home and elsewhere,

they are euphoniously called pico-flores, or chuparosas. Also the old Carib word *colubri* still persists, and indeed has been incorporated into scientific parlance.

We turn to the origin of the technical name with less assurance, but are pleasantly surprised. Carl Linnaeus, the dean of the origin of technical nomenclature, gave the name *Trochilus* to all the known eighteen species of hummingbirds. He lifted this name bodily from the Latin of the Romans, which people applied it to any small bird, such as a wren.

The first specimen of our particular species came into the hands of M. Lesson in 1832, and he named it *Trochilus kingi*. Why *kingi* I cannot discover. The more appropriate name *Lesbia* followed in 1863, the connotation a resemblance to the brilliance of the precious stone of Lesbos. Other specific names were now and then proposed, appropriately and enthusiastically, but lacking in seniority. Among these were *cyanura* and *gorgo*.

Throughout the years and at least currently acceptable, as having withstood the winnowing of priority, our Rancho Grande hummingbird has emerged as *Aglaiocercus kingi margarethae*. Aglaia as one of the three graces has come to stand for splendor or beauty, so Glorious or Bronze-tailed is a happy title. The identity of the namesake Mr. King is forever buried in the mind of the original describer. But what about *margarethae*? Early Teutonic ornithologists had a predilection for naming new birds after their women folk; witness a closely related hummingbird known at present as *Aglaiocercus emmae emmae*. We rather resent the saddling of our beautiful bird with the name of Margarita. Who was this Margaret? Was she perhaps some worthy but unlovely German hausfrau?

We turn to the original description in an old German magazine of 1863 and find Margaret vindicated. A free translation of Doktor Heine's museum Latin is as follows: "The description is of two specimens in the Berolinean Museum, from the Venezuelan province of Caracas, and named Margaretha in dedication to the highly esteemed maiden sister of Doktor Heine, a young girl exceedingly fond of kingfishers and hummingbirds."

Hoch, Fräulein Margarita Heine, this pleasant news of you after eighty-four years, makes you a real personality, and we welcome you to a permanent place in our trinominal nomenclature!



WHAT DO WE HAVE IN

Jackson Hole?

OLAUS J. MURIE

Spring migration of elk in front of the Tetons, in what is now Jackson Hole National Monument. (Photograph by the author)

FOR MANY YEARS Jackson Hole has been associated with a great elk herd. After the "great slaughter" of game animals in the latter half of the last century the Yellowstone National Park and the Jackson Hole country harbored the largest remaining nucleus of wapiti in the country, where the species was then making its last stand, and from where it has since become re-established in many parts of our land.

Slowly, inexorably, man's economic expansion squeezed in on the wintering grounds of the Jackson Hole elk herd. The sage plains to the south had been pre-empted and were denied it. Present day elk know nothing about these ancestral wintering grounds. In the valley itself ranching developed, and eventually a seven-mile drift fence to protect ranchers from depredations by the herd further restricted it in winter. Not only that. The elk themselves, crowded in large numbers on a shrinking range, destroyed the willows in the bottom lands, the aspens along the foothills, and in general played havoc with the natural forage supply.

For decades there had been a tug-of-war over what to do with or for the elk. Eventually, by piecemeal, a Federal refuge was acquired, and the state of Wyoming also acquired a small feed ground.

The elk question is by no means settled yet. But in the meantime another smoldering issue has

come to the front: What to do with Jackson Hole itself!

This valley, lying at an elevation of 6,000 feet, bordered on the west by the spectacular Teton Range with peaks rising some twelve to fourteen thousand feet above sea level; with mountainous game lands on the east and north; and with the sinuous Snake River winding through the sage-covered valley floor, from time immemorial has been noted for its beauty. Osborne Russell, a trapper who traveled through here to and from the Yellowstone in the years following 1834, spoke enthusiastically about the wildlife around Jackson Lake. Owen Wister visited the country about 1890 or earlier, and in writing about it expressed his opinion: "Of all the places in the Rocky Mountains that I know it is the most beautiful," and he advocated that ". . . its trees and waters should be kept from man's irresponsible destruction. . . ."

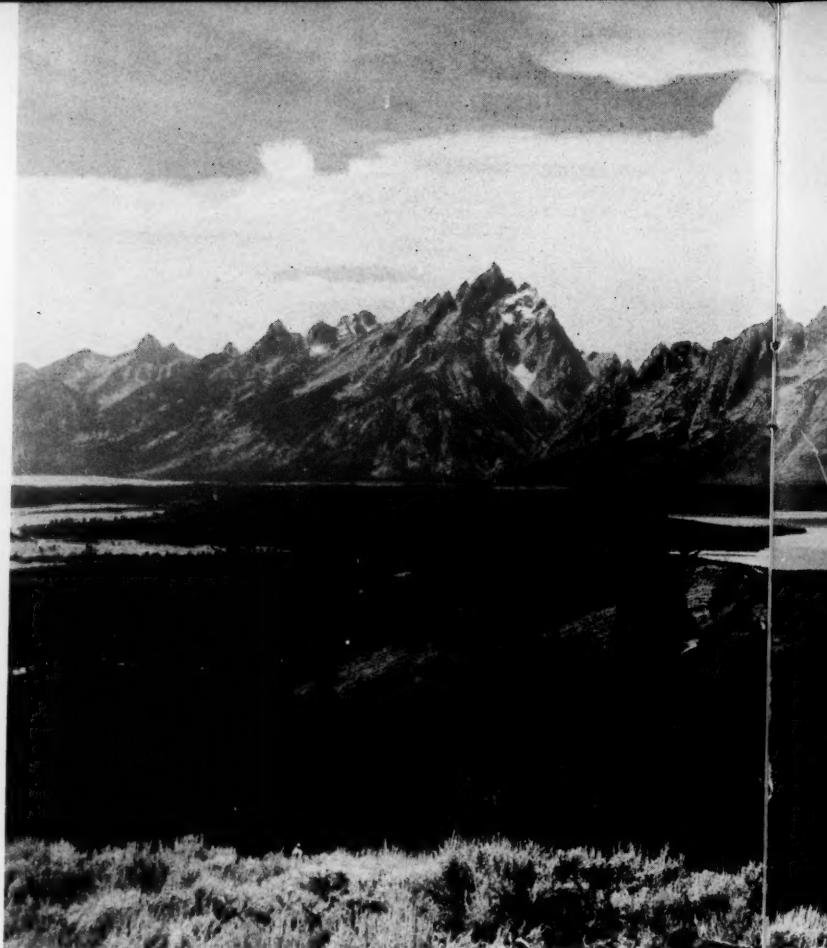
In more recent years there have been repeated attempts to implement Owen Wister's thought by placing upper Jackson Hole under Federal protection; and perennial attempts have been made to thwart such a move. The creation of Grand Teton National Park, comprising the Teton Mountains themselves, was bitterly opposed—but it was finally accomplished.

The story of continued efforts to include within the national park part of the valley itself has been pretty well known—the purchase of many private

"Surely this valley, looking up to the towering Tetons on the west . . . should be only a source of inspiration and enjoyment for the people of America. Instead, it has virtually become the Vale of Controversy."

Owen Wister said: "Of all the places in the Rocky Mountains that I know it is the most beautiful. . Its trees and waters should be kept from man's irresponsible destruction."

Jackson Hole and the Teton Range. (Composite from two photographs, courtesy of the National Park Service)



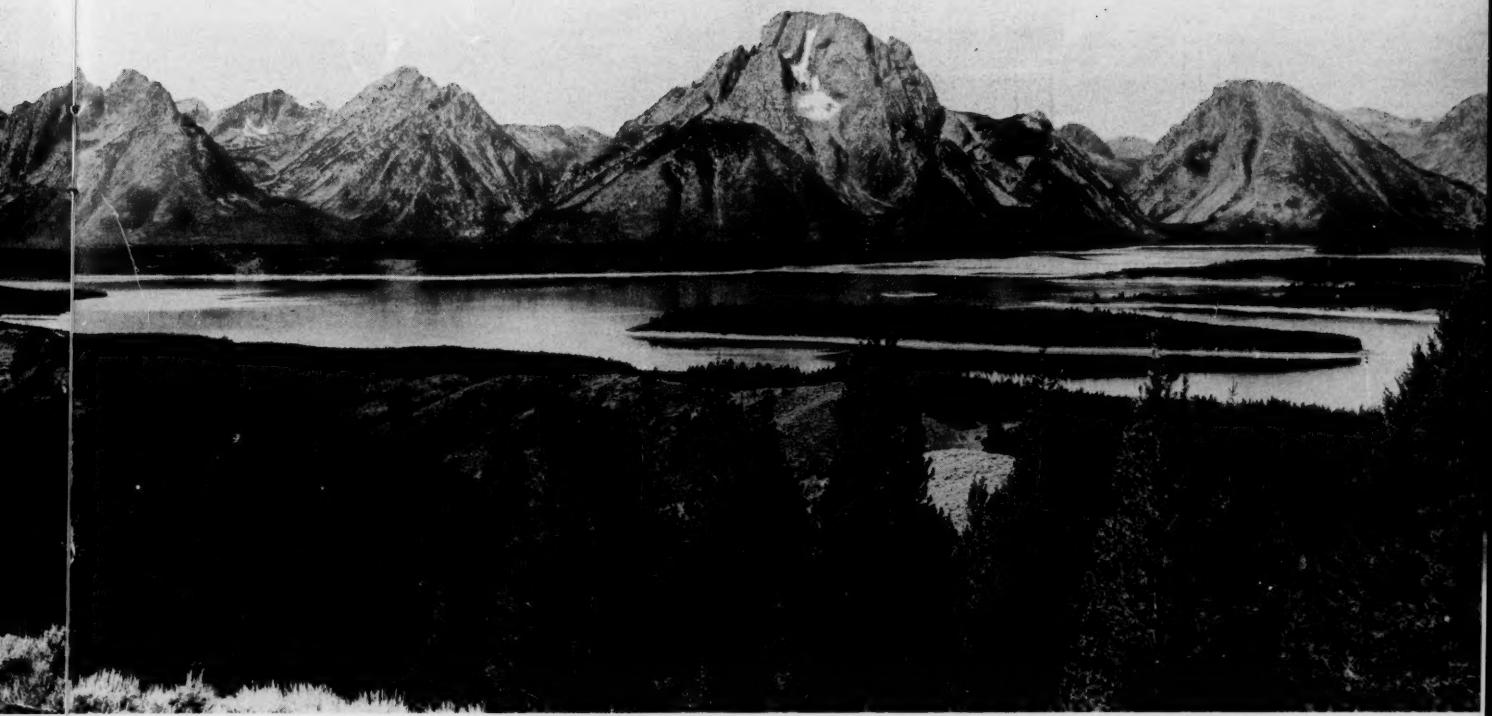
lands by Mr. Rockefeller for transfer to the Federal government, the bills proposed to place the area under national park jurisdiction, and finally the establishment of Jackson Hole National Monument by presidential proclamation in 1943. That did not settle the matter, however, for Wyoming congressmen have repeatedly introduced bills to abolish the monument.

Why all this fuss? Why this bitter fight over giving adequate Federal protection to one of the outstanding beauty spots of our nation? While we were fighting over this issue, an oil company managed to obtain leases for oil drilling in the Mount Leidy area in the national forest on the east side of the valley, and the national forest's Teton Wilderness Area has been threatened with similar exploitation.

Surely this valley, looking up to the towering Tetons on the west, sloping up to the aspen-clad foothills in the east where the wapiti still travel in annual migration, and looking to the blue hills of

the Wilderness Area in the north where wapiti summer; surely such a setting of valley and mountains, containing in its varied terrain a fauna and flora not much changed since the time of the Indian and the Mountain Man, should be only a source of inspiration and enjoyment for the people of America. Instead, it has virtually become the Vale of Controversy.

Why should this be? Why such bitter opposition over a period of more than twenty years? Part of the answer is a sordid feud involving personalities, not worthy of consideration. But partly, too, there have been introduced economic and personal objections. Some of these have been shown to be false, others have been met. There is a bill before the Sub-committee on Public Lands, H. R. 3035, which would compensate Teton County for loss of taxes on private lands that have been acquired. Certainly personal problems should be handled with justice, and full provision has been made for doing so.



A few objections are still advanced. Some of those who have testified vehemently against Park Service administration of this area have been officials of livestock or other associations, who are not themselves from Jackson Hole. These men have boldly argued the "public lands" theme, objecting to Federal ownership of certain lands in Jackson Hole. In other words, such officials have obviously identified the Jackson Hole issue with their well known efforts to gain private control of our public lands.

In the summer of 1947 Congressman Barrett amended his "abolishment" bill, H. R. 1330, to provide that a small portion of the present monument be added to Grand Teton National Park, throwing the remainder into the national forest. This had been openly stated as being done to permit summer homes on the shores of Jackson Lake. This so-called "compromise" would accomplish nothing constructive, but would leave the way clear for private exploitation in a scenic area that obviously

should be dedicated strictly to public use.

Meanwhile facilities of Grand Teton National Park are seriously overcrowded. Each year visitors are pouring in by additional thousands. A news release reported 144,261 visitors to Grand Teton National Park in 1947. Utah led with 17,969, California was a close second, and Wyoming third. They came from many states, from Canada, Alaska, Hawaii, the Philippines, Belgium, England, France, Turkey, Argentina, Brazil, China, and other foreign countries.

With the people coming in from everywhere, in growing thousands (8 per cent increase over 1946) to enjoy the beauty of upper Jackson Hole and make it part of their lives, we are asked to be niggardly in furnishing them space for appropriate accommodations. We are asked to abolish most of the monument, according to amended H. R. 1330, in order to inject private homes on the shore of a beautiful lake—a lake that is needed for public use, a lake that carries the reflection of glorious moun-

tains, a lake that is such an integral part of the Jackson Hole recreation picture.

Some of the opposition to the national monument has, in my opinion, a wholesome background. There is a nostalgia for the freedom of the frontier, a fear that Federal administration will change the

aspect of our valley. Speaking generally, such fear is not without some foundation. But we are faced with the fact that the American public is coming en masse. The Congress of the United States has designated the National Park Service as the agency to administer just such areas of concentrated recreation. We can still save much of the original charm of the Jackson Hole country if we act wisely—if we insist on simplicity in accommodations in keeping with the character of the country and if we carefully avoid the pitfalls of irresponsible private exploitation. We need to co-operate with the National Park Service in developing a suitable plan. We need to help them resist the inevitable pressures for unsuitable developments. We need to help the visiting public get the most of inspiration and satisfaction from their stay in Jackson Hole. We need to help preserve an administration of the area that will keep its natural features unimpaired, so far as it is humanly possible, for those who come after us.

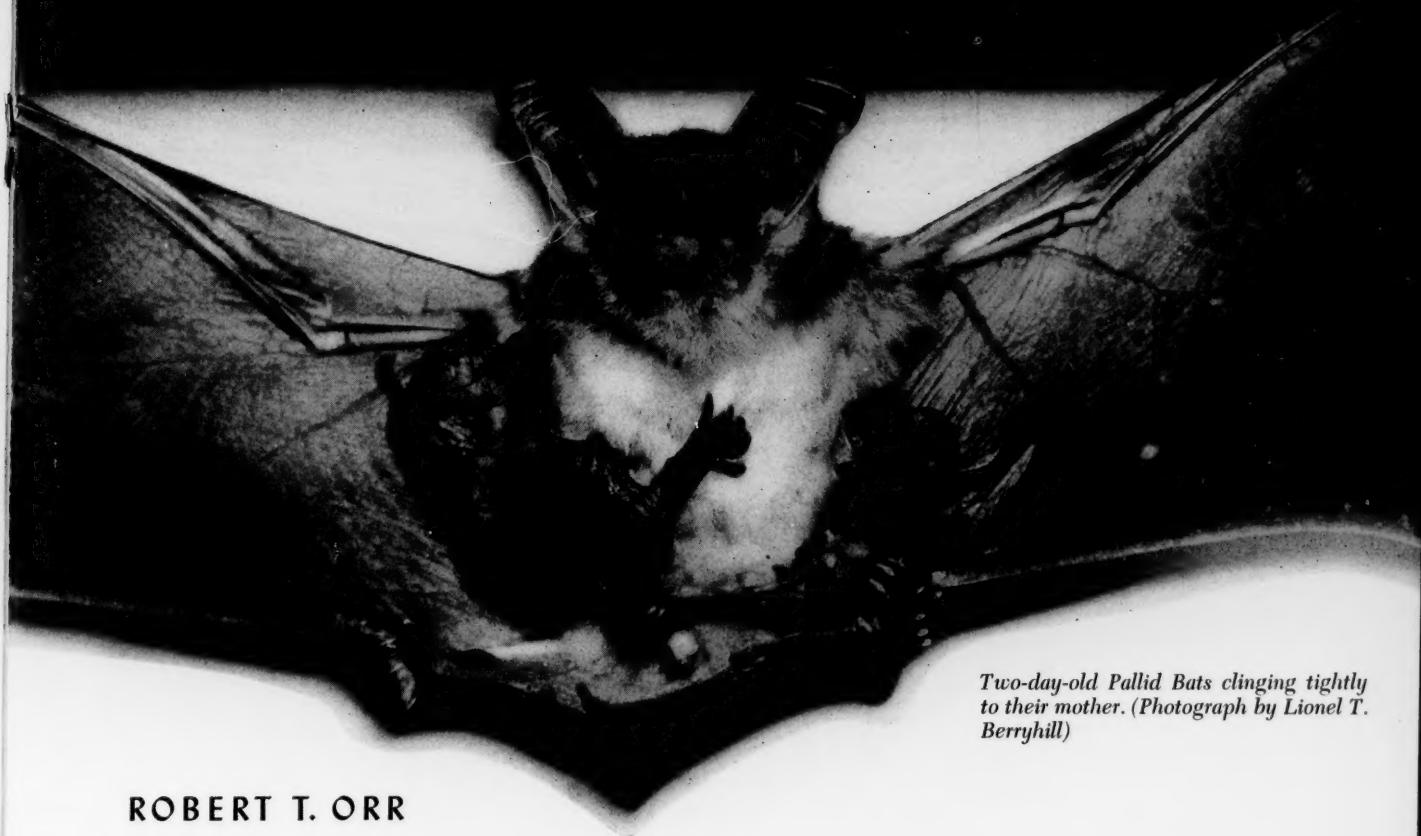
The elk are still here. Their spotted calves may be found in May and June among the aspens and bottom lands of Two Ocean Lake, Pacific Creek, and Buffalo Fork—an invitation to the camera enthusiast, the naturalist, the lover of the out-of-doors. Moose have become so abundant that they are now the chief wildlife feature of the monument area, summer and winter. We have lost the white-tailed deer and the antelope. But the mule deer is here. A small band of mountain sheep in the Tetons, partly on monument area, needs encouragement. A few trumpeter swans are still in the valley and should be encouraged to come back where they once nested. With protection we can hope to have the loons back. Canada geese nest on the Snake River bars and at beaver ponds. Harlequin ducks nest here, a few. There are marten in the mountains, beaver in the bottoms and in mountain streams. A few grizzlies are coming back. Ruffed grouse, blue grouse; rosy finches on the mountain tops, sage grouse in the valley sage; Steller jays, bald eagles, meadows of wild geraniums, gentians on the stream bank, gilia in the sage, showy primroses on the cliffs—these are the Teton country. We have a flora and fauna in a setting of incomparable beauty. A national park and monument with the Teton Range and a charming valley at its base, a national forest with its wilderness area and its hunting grounds, together form a recreation unit hard to duplicate.

But there is H. R. 1330 waiting in Congress.

"Spotted elk calves may be found in May and June among the aspens. . . . The mule deer is here. . . . We have a flora and fauna in a setting of incomparable beauty." (Photographs by the author)



BATS: Navigators of the Night



Two-day-old Pallid Bats clinging tightly to their mother. (Photograph by Lionel T. Berryhill)

ROBERT T. ORR

BATS ARE UNIQUE among mammals in possessing the ability to fly, a power which they share with most birds and many insects. Other so-called aerial mammals, such as flying squirrels, flying lemurs, and flying phalangers, actually can do no more than glide through the air because they have developed additional supporting surfaces in the form of folds of skin between their front and hind legs.

Bats possess true wings, which, however, differ fundamentally in many respects from those of birds. The bird's wing shows both a reduction in number and fusion of many of the bones of the wrist and hand. This reduction and fusion of the skeletal elements is compensated for by the presence of large, strong feathers along the posterior

margin of the fore limb so as to present a broad flight surface for support in air. The wing of a bat has developed through an elongation of the bones of the palm and fingers, with the exception of the thumb. These structures are connected together by a thin, tough, double membrane which extends backward to connect with the hind legs. Frequently the legs are also connected with part or all of the tail by an additional supporting membrane of a similar type.

Bats are in no sense a recently developed group of mammals. Indeed, their ancestry seems to date farther back in time than that of most mammalian orders. Finely preserved fossils of bats have been found in early Eocene deposits which geologists tell us are over 50,000,000 years old. All evidence

indicates, however, that they arose from primitive insectivores, a group now best represented in North America by the moles and shrews.

Human beings have long been interested in bats because of the ability of these creatures to fly with such ease through the night air. They have become incorporated into the legends and folklore of many peoples for ages past. In the last century and particularly in the past several decades man's increasing interest in the accumulation of facts and the search for truth has led to the scientific study of these flying mammals and to various attempts to explain their seemingly unusual power to navigate the airways of the darkest night.

Most birds have remarkably keen vision which, depending upon the species, may be adapted for close range, for distance, for diurnal or nocturnal activity. It is not too difficult, therefore, to understand how a flycatcher can sally forth in the daytime from a perch and secure a nearby insect from the air, or how an owl, by the combined use of its keen eyes and acute hearing, can detect the movement of a small animal on the ground at night.

Bats show no unusual powers of sight, such as are possessed by birds, and can in fact fly and avoid obstacles with equal agility when blinded as with their vision unimpaired. Furthermore, the food of most of our bats in temperate North America consists of flying insects which are caught on the wing between dusk and dawn, a difficult task even with keen vision, especially for forest inhabiting forms. Many theories were presented in former years to account for these seemingly unusual abilities of bats; but, while some were true in part, none offered a completely satisfactory explanation. It was suggested that bats heard the faint buzzing sounds made by the wings of tiny flying insects and that they detected pressure

Crevices in cliffs are favorite homesites for many kinds of bats. The arrow in the picture to the right indicates the entrance to a roost occupied by about one hundred Pallid Bats and a few Mexican Free-tailed Bats in western Kern County, California. Standing on the two flat stones, the author could just reach the crevice. (Photograph by the author)

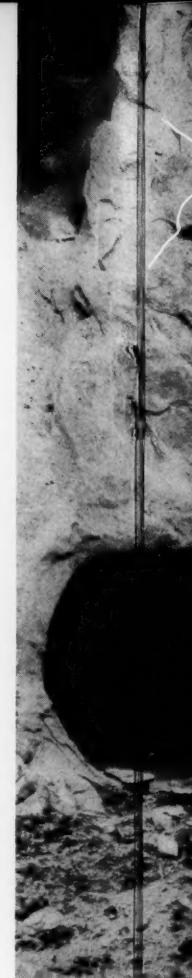
Young bats seem to be all feet and thumbs. Below, a three-day-old Pallid Bat. The rule shows centimeters and inches. Approximately life size. (Photograph by Lionel T. Berryhill)



changes due to air compression on coming close to objects while moving through the air.

It was not until physicists developed an instrument for the detection of sounds above the range of human audibility that an acceptable solution was presented. Then it was demonstrated that bats in flight are capable of producing supersonic sounds—that is, sounds of very high frequency entirely out of our own range of hearing,

Bats are bright, intelligent animals, and are often tamed quite readily in captivity. (Photograph by Lionel T. Berryhill)





yet presumably audible to bats. Furthermore, these sounds are uttered very rapidly, sometimes fifty times per second, particularly when the animal is approaching an object. The obvious plausible explanation is that bats rely upon the time required for the echo of their own sounds to be reflected back from nearby objects to determine proximity. Perhaps the relative intensity of the echo is also an aid in accomplishing this. Similar sonar devices are used by man in determining distances, especially ocean depths. If large numbers of these echoes are received within a short time it is possible that a concept of size and form can also be gained.

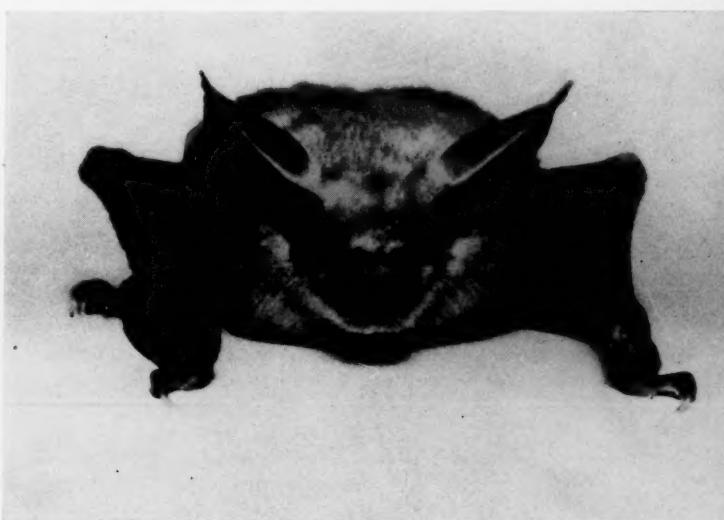
Bats are of unusual interest not only because of their specialized powers of flight and their sound producing and receiving mechanisms but also because of certain phases of their life histories. Most of our North American species of insectivorous bats that have been studied have been found to breed in the fall of the year. The embryological

development of the next year's young, however, does not begin until the following spring because it is not until then that the females ovulate and true fertilization occurs.

Before the young are produced in summer the pregnant females of many colonial species of bats separate from the others and retire to what might be called "nursery colonies" where their young are born and reared. Another rather remarkable fact is that in most species of bats observed the young are born tail first rather than head first.

Young Pallid Bats, such as the writer has reared in captivity, are essentially devoid of hair at birth, and have their eyes and ears unopened. Their hind feet and thumbs look grossly out of proportion to the rest of their bodies since they are nearly as large as those of adults. This is necessary because most young bats cling tightly to their mothers for some days after birth, even when the parents go out on the wing at night for food. The voice of a young bat is fairly strong at the time of birth and is heard most often when it loses hold of its mother's nipple.

Within a few days after birth the eyes and ears of baby bats open; then they begin to take an interest in their surroundings. Mother bats care for their offspring just as do mother cats. They are solicitous for their welfare and keep their tiny bodies clean by frequently licking them. They bare their teeth and produce loud buzzing sounds to intimidate anyone who may seem to them a potential enemy.



The external ears of many kinds of bats are often very large in proportion to the size of the head. (Photograph by Lionel T. Berryhill)

Hair makes its appearance slowly on young bats, but by the time they are three or four weeks old they are fairly well furred and in most species



Three species of bats—Yuma, Pallid, and Mexican Free-tailed—share a roost in an old winery, Sonoma County, California. (Diorama, California Academy of Sciences)

appear darker than their parents. Since insect-eating bats must normally fly to catch their food, young bats are probably dependent on their

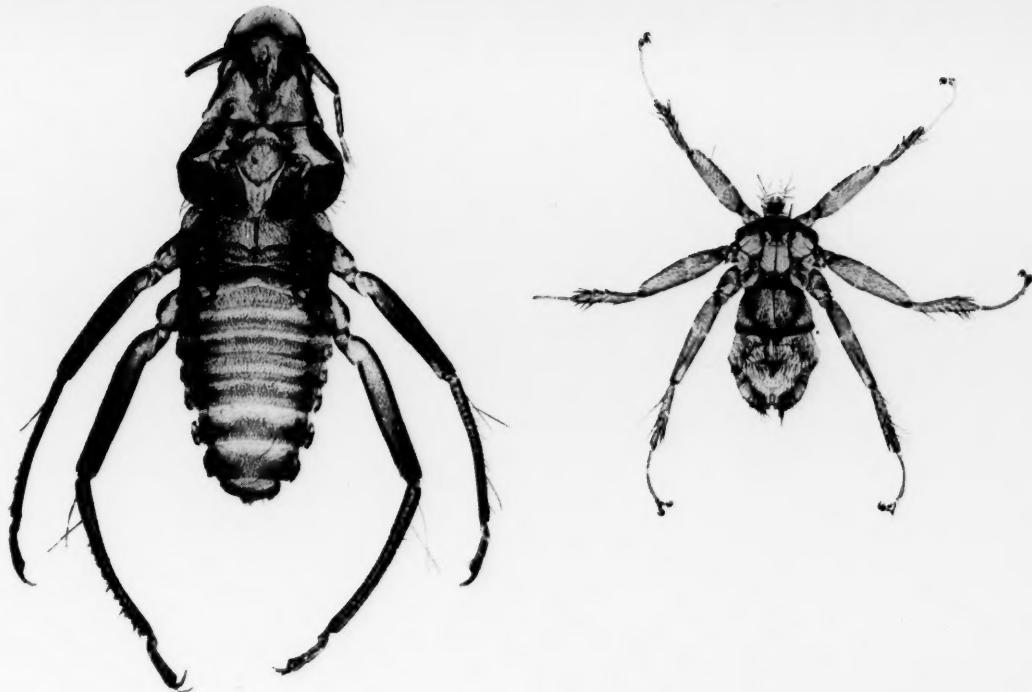
mother's milk for a longer time than most small mammals of comparable size. It may seem strange to see a young bat, nearly as large as its mother, nursing, but—so far as known at present—this is its only source of food until its wings are fully grown and it is capable of performing skillful aerial gyrations of its own.

Food is an extremely important factor in the lives of bats because they use a great deal of energy in flight and consequently have a high rate of metabolism. Even in captivity some kinds of North American bats will eat an amount equal to one-third of their own body weight in protein-rich insect food within a twenty-four hour period.

Since insects are scarce in the temperate and northern regions of our continent in winter, bats that are dependent on such food have developed certain methods of circumventing this hazard. Some species that are tree-dwellers migrate southward in winter, at least in parts of their ranges, to warmer regions where food is available at this season. Others, particularly cave-dwelling kinds of bats, select dens where there is a fairly constant low temperature. Here they go into a dormancy which hardly appears to be true hibernation—they can be aroused to activity within a few minutes. Such dormant bats usually cluster together in large numbers.

In recent years many persons have been active in the banding of bats to determine something of their local movements, migrations, and longevity. But many interesting facts remain to be uncovered—facts concerning the life histories of even our most common species, to say nothing of the many rare kinds known only from a few museum specimens. And as true knowledge of these extraordinary creatures grows, the odious attributes of superstition fade into the limbo of all that men have invented to appease their ignorance.

Navigators of the night—a description as appealing to the imagination as any in folklore, yet squaring with facts. Not only do bats seem to con their way unerringly through the dark by a device man regards as an ultra-modern invention of his own, but deep within the perpetual blackness of some cave the tenant bats hang from their vault until the moment dividing day from night in the world outside, then out they come as if on some signal. One day, perhaps, a patient observer or experimenter will learn how certain cave-dwelling bats *know almost to the minute when it is night*.



Of Bats and Bugs

EXISTING nowhere else in nature but in the dense fur of bats, the two strange, seldom seen insects pictured above are good examples of the parallel development of two unrelated forms of life. The highly magnified photographs show, to the left, a member of the order of true bugs, the Hemiptera, of which the squash bug is a familiar—and more typical—example; to the right, a representative of the Diptera, the order which includes houseflies and mosquitoes. As insect relationships go, bug and fly are worlds apart.

Nevertheless, one quickly sees that our two bat-fur inhabitants have many general features in common: they are wingless; their long legs end in grappling claws; their bodies are clothed with bristles; the color of both, if we are looking through a microscope, is pale reddish tan.

During millions of years of evolutionary trial

and error, these two appear to have reached the same conclusion on what it takes to live in a bat's fur—a most peculiar and highly restricted environment—despite their start from different branches of the tree of insect life.

The bug is a member of the family Polyctenidae, a small group of rare insects of which fewer than one hundred specimens have so far been collected. The less rare fly belongs to the family Nycteriidae. Both insects are about flea-size and must be specially mounted on microscope slides to be studied. Little is known of their life histories.

Although their food requirements make them probably the most efficient of insect collectors, bats are plagued with many types of insect parasites. Besides the two here described, they bear their share of true lice and fleas. They even have bedbugs in their roosts!

ROBERT CUNNINGHAM MILLER

Mystery of the Disappearing Sardine

What does the future hold for a sixty million-dollar California industry geared to the phases of the moon? Biologists, oceanographers, Government officers are mobilizing to seek—sardines!



Purse-seiners idle in Fishermen's Slip, San Pedro, California. The balls in the skiff are net floats.

Photographs courtesy the Bureau of
Marine Fisheries, California
Division of Fish and Game

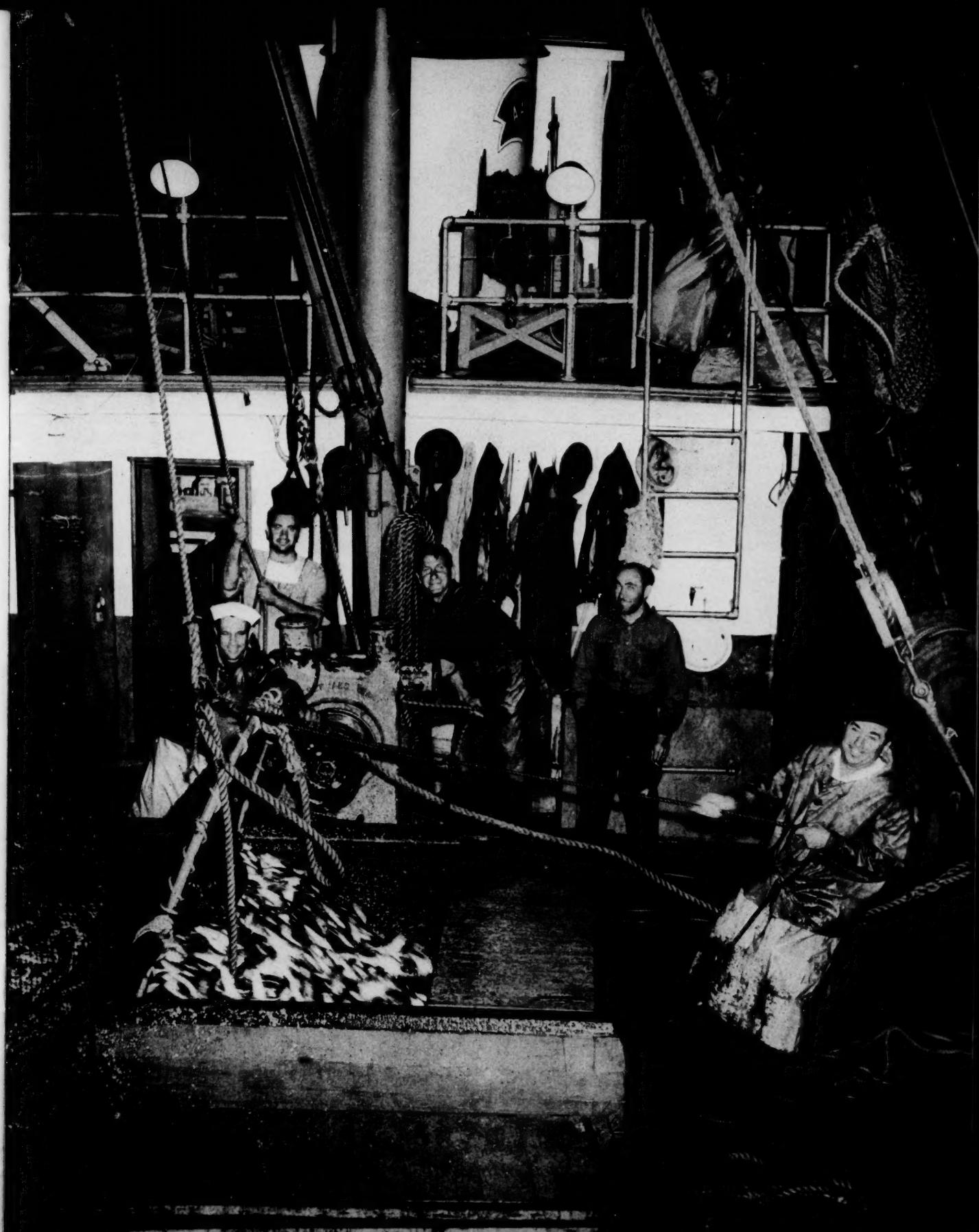
ANYONE WHO HAS EVER OPENED a tin of sardines is doubtless familiar with a little key of simple design provided for that purpose. Rarely is this key given a second thought unless it happens to be missing, in which case the frustrated sardinophile becomes acutely aware of its absence and is likely to mutter imprecations while hunting for a can-opener. But let us give this key a second thought, not simply as a convenience but as a symbol. To any individual who can put his imagination to better use than dreaming of his supper, it is a key to adventure, a key to romance, a key to the beauty of little ships and salt spray and west winds and long seines and bronzed fishermen—and a key that opens the door on a mystery science has not yet solved.

No little of the interest and charm of California seaports, no small degree of their unforgettable appeal to the artist, the writer, or the visitor from afar, derive from the presence of the sardine fishing fleets—the purse-seiners riding at anchor or tied up along the docks, the fishermen mending their nets or tying on new floats or attaching new weights to the lead line, conversing the while with Mediterranean fervor and often in a Latin tongue. This Old World flavor is authentic, for sardine fishing has in a sense been transplanted here; the California sardine is a relative of the sardine that has been fished so long in Southern Europe, and the name itself appears to have come from the island of Sardinia.

Not that the fishermen think of themselves as picturesque or their calling as romantic, any more than a locomotive engineer thinks of railroading in terms of its appeal for small boys in rural villages along the right of way. Sardine fishing is hard and heavy work, fraught with difficulty and danger and disappointment. The men get weary and wet and cold, and even as you and I they dream in odd moments of getting a million dollars from some mysterious source, and quitting the job and living happily ever after.

Nevertheless, whatever the fishermen themselves may think about it, sardine fishing inescap-

Monterey Bay, September 1945. Sardine fishermen are happy when the fish spill into the seiner's hold. But the two seasons since 1945 have not been happy ones for California sardine fishermen.





Daytime set showing extent of the net. A circle has been made around the fish; the bottom of the net has been pursed and the rings lifted up against the side of the boat. Men in the skiff are beginning to bunch up the cork line. (Photograph from the air by Bureau of Marine Fisheries, Division of Fish and Game)

ably appeals to the layman as a picturesque, imaginative and even mysterious pursuit; and it could hardly partake in greater degree of all these qualities if the pattern of the fishery had been determined by an artist and a poet in consultation with a necromancer. All fishing has a flavor of the esoteric, not to say the occult; but listen to this. Sardine fishing in California—one of the great fisheries of the world—is carried on under cover of darkness, and not only at dead of night, but in the dark of the moon!

Of course the fishermen have an explanation for this, as any fisherman always has for whatever he does. This time, you are likely to say to yourself, the explanation needs to be good. Well, it is. The explanation indeed is just as remarkable as what it sets out to explain. The reason the fishery waits on darkness is that the schools of sardines are located by the phosphorescent glow produced in the water as they swim along.

Sea water contains a host of organisms, chiefly microscopic and varying in abundance from place to place and season to season, that glow in the dark when stimulated by contact or by agitation of the water. A school of sardines will stir these organisms to luminescence. So on moonless nights the fishermen cruise back and forth upon the fish-

ing grounds, gazing intently into the plashing darkness for the faint pools of light that tell them where the sardines are, which way they are moving, and whether the school is large enough to make it worth while to set the net.

When a school of sufficient size has been sighted, two men take off in a skiff with one end of the seine, and still in darkness and a silence that is almost unbelievable for so complex an operation, the net is payed out and the school of fish surrounded. Cautiously the lines are drawn, pursing the seine at the bottom. Now the need of darkness and silence is past. Flood-lights are turned on, the net is drawn slowly aboard and the silver cargo is brailed into the hold. A single haul of the net may yield a hundred tons of sardines. Even larger catches, up to 300 or 400 tons, are not infrequently reported.

Now we have explained why sardines are fished in darkness. No sorcery, no incantations at midnight—the mystery is gone. But wait a moment, we have an afterthought. In the Northwest, where there is a smaller fishery, and where indeed they don't deserve to catch any sardines at all because they insist on calling them pilchard, the sardine fishery is carried on by daylight. Off the coasts of Oregon, Washington, and British Columbia, if

there are any sardines to be caught the fishermen seem to be able to catch them at nine o'clock in the morning or at high noon, and sleep at night the way a man is supposed to.

If you quiz your California fisherman about this daylight fishing, he has probably heard about it, but he doesn't think much of the idea. He has also heard that in the Northwest farmers do spring plowing in the rain. He doesn't think much of that either. For a moment you are tempted to think he is just being stubborn, and that the only reason he fishes at night is because that is the way he learned to do it, and the way he wants to. But here is the most curious fact of all.

Whenever fishing boats and fishing crews from the Northwest come into California waters to fish sardines, they fish exactly as the California fishermen do. No matter that, fishing out of Astoria, they could locate the sardine schools by daylight; in California they can only find them at night. It's no use asking a fisherman why this is, and it's no use asking me. Ask a sardine.

This, then, is the pattern of the California sardine fishery—an industry with a capital investment of more than sixty million dollars and paying the fishermen ten or twelve million dollars a year, geared to the phases of the moon! Let us consider now some of the ways in which this pattern of operations relates itself to the lives of the many thousands of persons who are directly or indirectly involved.

Since the fishery is carried on at night, the boats are in harbor in the daytime—an asset to the local chambers of commerce and tourist bureaus that is beyond price. Not to be crassly commercial, let us think of literature and art. How much more interesting to a writer or a painter is a dock with boats tied up alongside, or a harbor full of little ships, than just an empty dock all by itself, or a harbor with only water in it!

And let us not forget the fishermen, the principal if wholly unself-conscious actors in this drama. Because the fishing calls for total darkness, every moonlit night finds the sardine boats at anchor and the fishermen ashore to date the girls from cannery row. And since, when the boats are not fishing, the canneries do not operate either, the girls are at leisure to enjoy a late and carefree evening. The cannery whistle will not blow tomorrow.

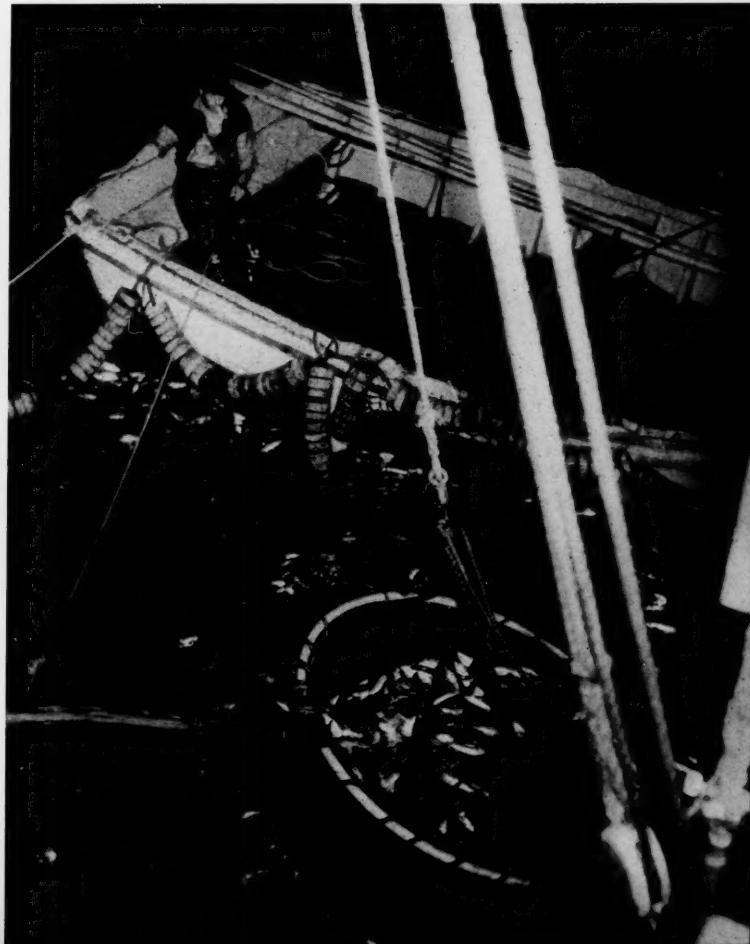
As the full moon rises over the hills to the eastward of the harbor—any harbor of the sardine fleet—it looks out upon a little forest of masts and

booms, and a pattern of white deck-houses, and a company of sturdy hulls rocking comfortably upon the pulsing swell. The anchor chains clank gently in a kind of rhythmic counterpoint to the music of accordion or guitar, or of voices raised in song. So you think "Santa Lucia" and "O Sole Mio" are a little hackneyed? You had better change your taste in music or else stay far away from Italian fishermen on moonlight nights.

But maybe after all you will not have to struggle with this problem. There is no happiness in the heart of the sardine fisherman today, and song comes only rarely to his lips. For two years now the sardine fishery in northern California has almost completely failed. In the last two weeks of August, 1946, thirty-two boats fishing out of San Francisco caught a total of 108 tons of sardines—no more than a single boat might take in one haul of the seine when fishing is good. Seventy-five boats fishing out of Monterey did only nominally better. This proved to be the pattern of the season, and after further unsuccessful effort the boats went south to participate in the southern California fishery.

In 1947, as this article is written in November, the picture is still more gloomy. No fish of any con-

A large dip net is used to transfer the catch from the purse seine to the hold of the vessel. Picture was taken at night in Monterey Bay.



sequence at all have been caught in northern California waters, and again the boats have moved south in quest of better fishing.

But what of the southern fishery? In the autumn months of 1946 the catch in southern waters was remarkably good, and there was reason to think that the sardines were just behaving differently and, on account of ocean temperatures or for whatever reason, had gone south for the winter. In the opening weeks of the current fishing season, however, the sardine landings in southern California have been markedly reduced, leading to a suspicion that last year's catch was due not to a concentration of fish in that area, but to a concentration of fishermen and of fishing effort.

The impact of this deterioration of the fishery does not fall on the fishermen alone. The industry involves canneries and reduction plants, the latter producing sardine meal and oil. It involves boat-builders and ship-chandlers and net-makers, and builders of marine engines and of cannery equipment, and bankers and brokers and bookkeepers, purveyors of food and drink and amusement, and last but not least, the people who manufacture those millions of cans with the little keys attached.

The number of persons indirectly affected by the sardine industry cannot be estimated; the number directly involved—the ones who fish, or work in canneries or reduction plants in California—approximates 25,000.

Moreover, since sardine fishing and canning and reduction make up a seasonal industry, whose maximum labor demand occurs in the fall and winter, the schedule of operations interlocks ideally with the needs of a host of California's migratory workers who, having spent the summer in agricultural pursuits, must find some other occupation to carry them through the rest of the year. When a sardine season fails, it means genuine hardship for thousands of people. Repeated failures mean a catastrophe of major proportions. Bear in mind that in 1945 and for some years preceding, of all commercial fish of all species landed at American seaports—east and west and on the Gulf of Mexico—more than one-quarter were sardines from the coastal waters of California, Oregon and Washington. In a number of different years the sardine catch in California alone has exceeded half-a-million tons.

What now has happened to the sardines? Why did they abruptly disappear from the northern part of their range, where they had previously

been taken in so great abundance? Will they return? These are questions to which at present there can be given no certain answers.

Various theories have been suggested—a failure of spawning, a shortage of plankton food, changes of physical conditions in the sea, or simple depletion of the stock through overfishing. Any or all of these, or even something not yet thought of, might be the explanation.

Sardines spend all their life at sea, and a pelagic fish is the hardest in the world to investigate. Spawning takes place over an area of several hundred thousand square miles of ocean off the coast of southern California, between January and June but especially in March and April. It is believed mostly to occur within 100 miles of shore, but may extend as far as 300 miles out to sea. The eggs float a few days in the surface waters until they hatch, after which the young sardines—commonly referred to at this stage as "sardine larvae"—drift or swim to the southward, off the coast of Lower California where they remain a number of months. As they grow larger, they join in the annual spring migration to the northward. Many of the adults reach British Columbia waters, though the young do not go so far, perhaps only to northern California or Oregon. Then the migration is reversed, and in summer and fall the fish move southward again. It is during the southward migration that the fishing season begins—about August 1 in San Francisco and Monterey, October 1 in southern California.

Of course the sardines that are caught, and that means many thousands of tons, do not get back to the spawning grounds. But a female sardine may produce 100,000 eggs, and it does not require a very large breeding population to keep up the supply. Mathematically at least it is easy to have plenty of sardines. But the trouble is that sardines are popular with other than human consumers. As eggs or larvae or adults, they are eaten at one time or another by practically everything that lives in the ocean that is bigger than they are. We do not know, moreover, how the spawning and survival may be affected by fluctuations in oceanographic conditions. It is not easy to determine how large is the natural surplus that the fisherman may properly take without depleting the sardine population.

By reason of the existing emergency in the sardine fishery, energetic steps are being taken to obtain the information that is so urgently needed.

The Scripps Institution of Oceanography has received a special appropriation with which to place in operation two or possibly three ships to carry on sardine investigations at sea. At the request of the sardine industry itself, the California Legislature at its 1947 session doubled the tonnage tax on sardines to provide additional funds for research. The Congress has been urged to appropriate funds to enable the U. S. Fish and Wildlife Service to put at least two ships in service in Pacific sardine investigations. The California Division of Fish and

Game will continue its excellent work. British Columbia and the states of Oregon and Washington are expected to participate in a degree commensurate with the lesser importance of the sardine fishery in their waters.

If all these programs are implemented, the life history, habits and environmental relationships of the California sardine will be studied in sufficient detail that science can give the answer—and we hope a happy denouement—to the mystery of the disappearing sardine.

Fishermen arrange their purse seine on the turntable of their vessel in preparation for a haul. When this picture was taken, in September 1945 in Monterey Bay, these men could be sure of a full net, come night in the dark of the moon.



EARLE G. LINSLEY

Evening Skies of Winter

The Chart (on facing page)

THIS CHART represents the bright stars linked together to help identify the constellations. Since the stars are represented as they might be seen overhead on a crystal dome the map may be held overhead with the directions shown on the margin properly oriented, or it may be held vertically with the direction in which you face turned to the bottom.

The chart does not show planets. The planets visible in the evening sky are conveniently located as follows:

Venus is visible after sunset low in the west—at the beginning of the year, setting about two hours after the sun. It seems to move rapidly eastward on the sky but is easily identified by the brightness, outshining all other objects in the sky, and by the rapid change in position.

Jupiter, which has been east of the sun occupying a conspicuous place in the same area of the sky through the summer, was in conjunction with the sun on December 1, and hereafter is in the morning sky rising before the sun.

Mars was in quadrature with the sun on November 17, rising about midnight in late November, now early enough to bring it into our winter eastern sky. It is steadily becoming brighter and redder.

Saturn is a little less bright than Mars. These planets are not far from Regulus in Leo and can easily be located after the form of Leo is picked out by means of the chart. Note the difference in the steadiness of the light from the planets compared with that of Regulus, a white star.

The Winter Stars

The winter evening sky becomes more brilliant through November to March as the brightest groups of stars rise higher in the east until we

have a display of the largest number of bright stars it is possible to see at one time. A few selected groups are described here. Others will be described in later articles.

A convenient place to start, because it quickly catches the eye on a clear winter night, is with the little group high in the east called the Pleiades.

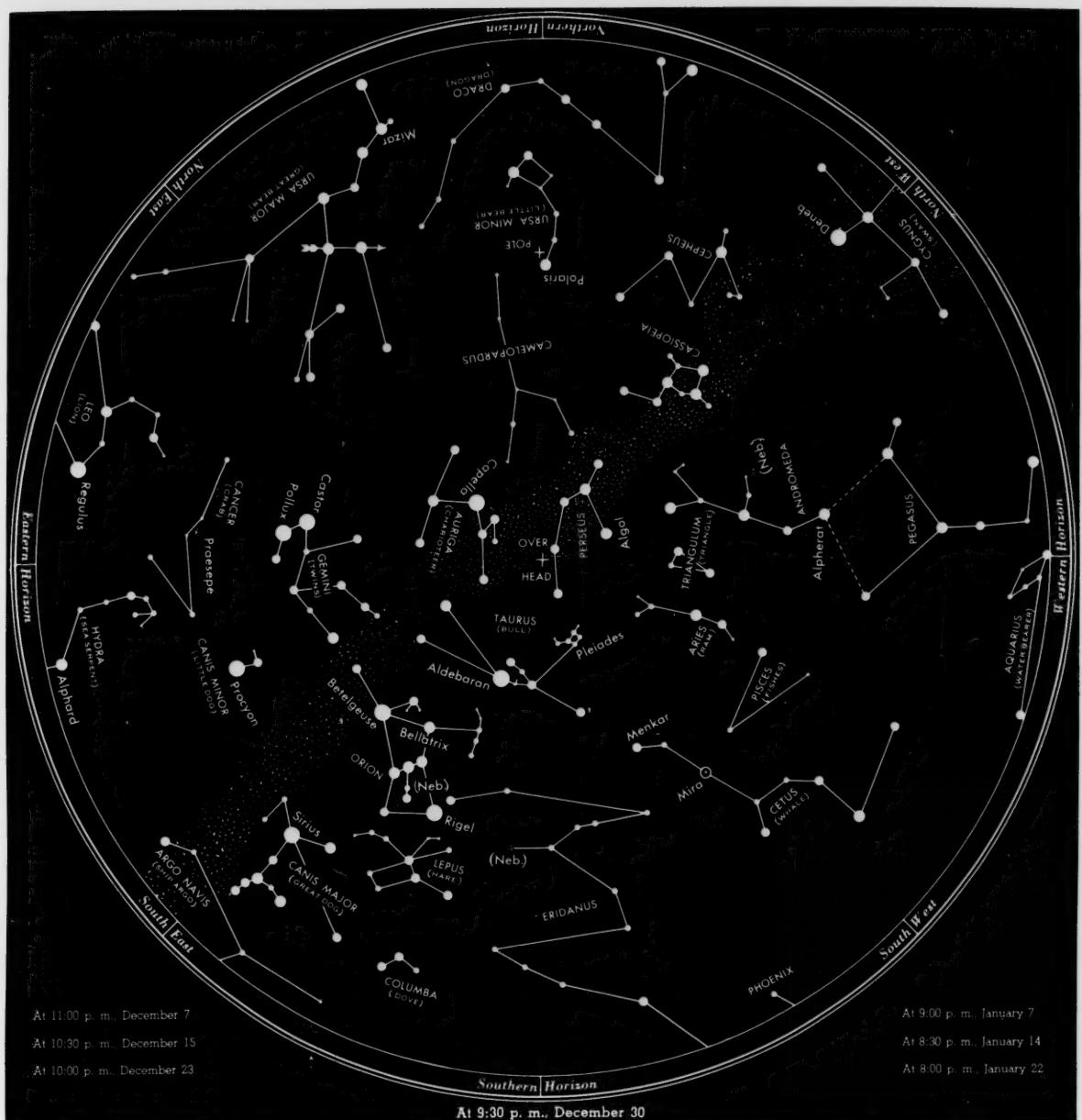
This group has attracted attention from remote times. It is often called the Seven Sisters, and very frequently mistaken by the inexperienced for the Little Dipper. While there is in the Pleiades some resemblance to a dipper, the constellation containing the group which is often—and properly—called the Little Dipper is located in the north, and we identify the North Star (or Pole Star) by it. If the Pleiades is confused with the other, all directions on our chart will be in confusion.

The *Pleiades* is a coarse or loose cluster as seen without a telescope. An interesting legend tells that there were seven of about equal brightness, but that one has been lost. This "lost" one is just below visibility for most eyes. More than one hundred stars can be seen in the cluster with a small telescope; more than two thousand have been counted on photographic plates. The whole cluster is enveloped in a misty nebulosity which appears to reflect the light of these great suns which seem to us as glittering diamonds. It takes well over three hundred years for their light to reach us. The cluster seems to be moving together somewhat like a flock of birds, converging towards the red star Betelgeuse in Orion. Of course this motion is not discernible by your eyes. It has been discovered by comparison through long years of study.

The legends and myths about these stars are interesting reading but do not compare, in the writer's mind, with the wonderful discoveries of modern astronomy in the realm of facts about this area of the sky.

The *Orion* group: No constellation surpasses Orion, the Warrior, in splendor. Rising in the east in the early winter, it becomes most spectacular in the south in midwinter. Orion has a central position in the winter sky with the celestial equator passing through the center, at "the belt." This position makes it visible all over the world. These stars of the belt are second magnitude and so evenly spaced that nowhere else in the sky are there three stars that need be confused with them. They are spaced in a line three degrees in length, so give a convenient measure for estimating degrees of arc on the sky.

The sword or scabbard of three fainter stars which hangs from the belt contains in the center, faintly visible without a telescope, the great Orion Nebula.



Betelgeuse, red, variable, a super-giant, is not truly of the Orion family of stars. Most of the Orion stars are of the B-type, with helium giving them a bluish white color.

There are many interesting things about Betelgeuse. The name is Arabic. There are several spellings and many pronunciations. The preferred spelling is used here. The preferred pronunciation is, Bet'-el-juz. You may avoid difficulty by saying

"Alpha Orionis," which is the astronomer's designation. The estimated diameter is about 240,000,000 miles.

Rigel (Ri'-jel) is intrinsically one of the brightest stars in the heavens. However, the distance of this star is nearly twice that of Betelgeuse. Our imagination can with difficulty conceive the brightness if it were as near to us as our sun.



*Range destruction, Mendocino National Forest. Sheep grazing on a badly overgrazed side-hill near the summit. White thorn (*Ceanothus*) shrub remains, but grasses and herbs are nearly gone and topsoil is largely eroded away. Gullying will be the next stage here in destruction of the land. (Photograph by U. S. Forest Service)*

A. STARKER LEOPOLD

The Threat to Our Western Ranges

THERE HAS BEEN developing since 1941 a strong and well-organized effort by western stockmen to take possession of vast areas of our public grazing lands. The organizations behind this move are the National Livestock Association and the National Woolgrowers' Association, and their stated objective is to wrest from Federal ownership, or at least from Federal control, millions of acres of public domain now administered by the Grazing Division, Bureau of Land Management, Department of the Interior, and by the Forest Service of the U. S. Department of Agriculture.

In these days of high prices the stockmen see a golden opportunity to "get rich quick" if only they can exploit the public ranges untrammeled by the present regulations which protect watershed and recreational values, wildlife, and the range itself. Within the past year conservation interests came to the shocking realization that this selfish venture

was on the point of succeeding. Bills prepared for submission to the 80th Congress, and strongly supported by the "Cow Bloc" in Congress, would have negated forty years of progress in regulation and management of public grazing lands. Fortunately, opposition was mobilized in time to prevent passage of any of these measures in the recent session of Congress, but as a result of the pressure the Grazing Service was crippled by drastically reduced appropriations and the Forest Service grazing policy is now under investigation by the House Public Lands Committee.

If "conservation of natural resources" is to be more than a dead slogan associated with past administrations, it is immensely important that the public realize the critical condition of the western ranges and the importance of strengthening—not weakening—regulation of their use.

Our system of national forests was established

CONSERVATION

between 1891 and 1907 for two primary purposes: (1) watershed protection, and (2) timber production. Grazing, wildlife management, and recreation were recognized as supplemental uses and the Forest Service has endeavored through the past forty years to administer these lands on a multiple-use basis so as to assure "the greatest lasting good for the greatest number of people." The Grazing Service was created by the Taylor Grazing Act of 1934 for the purpose of putting the balance of the public domain (mostly arid plains and brushlands) under a plan of management that would protect the soil, the watershed cover, and the forage itself. Both Services have tried to balance the intensity of grazing to the approximate capacity of the range by a system of permits or leases which specify the number of stock each permittee can turn on the range. A modest fee is charged for the grazing privileges. The number of permittees grazing stock on the public lands in 1946 were:

On National Forests	22,645
On Taylor Grazing Lands	21,329
<i>Total</i>	43,974

At the present time it is abundantly evident that initial estimates of the livestock-carrying capacity of the western forests and rangelands were too high. These lands have been overgrazed and are still being overgrazed. As a result of excessive stocking, forage has deteriorated on great areas of public domain and wildlife and recreational values are suffering. Erosion threatens to clog with silt the irrigation systems, power dams, and fishing streams that draw water from the highlands. It is imperative that this damage be alleviated at once by reducing the number of stock permitted on the public lands.

Yet in the face of this situation stockmen are demanding that grazing regulations be removed entirely so that they can exploit the public ranges at an even faster rate! Specifically, the organized cattle and sheep raisers are pressing for legislation authorizing the outright sale of Taylor grazing lands to the present lessees, operators, or permittees, and for additional legislation which will remove from the Forest Service its present right to regulate grazing on the national forests and put this power in the hands of local grazing advisory boards made up of stockmen. Even the national parks and monuments are under pressure to open their ranges to livestock. Every

annual report of the National Woolgrowers' Association since 1940 has included demands that the national parks be opened to public grazing. All other interests in and uses of these public lands are considered by the stockmen to be of negligible importance as compared to their "vested rights" as cattle and sheep raisers to exploit the range as they see fit.

The public domain in western America is the property of all Americans and should be preserved for the benefit of all. A certain amount of controlled grazing, consistent with watershed protection and recreational values, certainly is a valid use of range lands. But the proposal that grazing is the most important use of western lands and that the interests of 44,000 stockmen should take precedence over all other interests is a selfish, short-term point of view which the American people and Congress should vigorously oppose. One of the greatest needs of the West is for *more stringent* control of grazing by the Federal government to curtail the destruction of resources which is all too rapid now.

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REVIEWS

MAMMALS OF CALIFORNIA. By Lloyd Glenn Ingles. Stanford University Press, 1947. xix + 258 pp. 42 pls. 57 figs. (incl. maps). \$4.00.

California's mammal fauna is in number of kinds as rich as or richer than that of any other state, but there has been no book to provide the public with information about it. Way back in 1906, Frank Stephens, a veteran mammalogist of San Diego County, published a volume on *California Mammals* with the sparse knowledge then available. In succeeding years the body of information about the state's mammal fauna has increased greatly. Two technical "checklists" by Joseph Grinnell (1913, 1933) summarized knowledge on geographic distribution of California species and subspecies, and volumes prepared at the Museum of Vertebrate Zoology (University of California, Berkeley) included accounts of mammals in the Yosemite and Lassen regions and of California fur bearers. Meanwhile a rich harvest of factual detail, observations and records on distribution, habits, reproduction, food, and economic relations was accumulating in the technical and semipopular periodicals. But it was not until 1947 that the popular need was satisfied with the publication of *Mammals of California* by Lloyd G. Ingles.

The author, who received his collegiate training in California, taught for several years at Chico and now is Professor of Biology at Fresno State College. He has used every opportunity for field work with California mammals. He is a competent naturalist with much first-hand knowledge of his subject, he writes with a pleasant, easy style, and he is a proficient and persevering photographer who has labored long and hard in making pictures of mammals. All of these characteristics are reflected in his volume.

The book is intended primarily for the student, the budding mammalogist of early years, and that sector of the public interested avocationally in the native fauna. The author has sifted from the literature enough to map geographic ranges and to construct keys for identifying specimens in hand to the species level (some exceptions). The text accounts are of species, and in populous groups such as the white-footed mice, voles, pocket gophers, and chipmunks, one common and widespread representative provides the basis for a general account of habits, food, and related topics. Besides the maps, the line drawings illustrate skulls and footprints. The plates provide "portraits" in life of all the more important species.

A brief preliminary chapter tells how to study mammals, and the volume ends with an outline of classification for California mammals (to species), illustrated directions on "how to collect and make up study skins," and, appropriately, a list of records of diseases in native rodents with precautions for handling live or dead specimens.

Several unfortunate mistakes in spelling mar this otherwise admirable book and these should be corrected at the first opportunity: "Robert I. Miller" instead of Robert C. Miller; "Vernon Kellogg" for Remington Kellogg; "George Willetts" for George Willet; "Robert Holdenried" for Robert Holdenried.

Mammals of California should be at hand in all schools and homes where there is an interest in natural history. It will aid in spreading reliable knowledge of the state's fauna and should encourage many who vacation in the hills, mountains, and deserts to learn more about these natural denizens.

TRACY I. STORER

Division of Zoology
University of California
Davis

ONE DAY AT TETON MARSH. By Sally Carrighar.

Illustrated by George and Patricia Mattson. Alfred A. Knopf. New York. 1947. viii + 239 pp. \$3.50.

This book will be read by two classes of people, those who have been to the Grand Tetons of Wyoming, and the Jackson Hole National Monument, and those who have not yet been there but from this time on are going to want to go. And it will be appreciated by two groups of readers, those who read Miss Carrighar's earlier book, *One Day on Beetle Rock*, and those who didn't read it but are immediately going to set out to find a copy. This seems pretty well to cover the potential market, but we ought to mention a third group of readers—overlapping, it is true, one or more of the categories above—those who marveled over *Beetle Rock* as a first book, and wondered whether the author could ever do as well again. Those worriers can sit back now and relax.

Teton Marsh carries on the pattern of *Beetle Rock*, but only in the sense that a playwright allows himself to be bound by the requirements of the drama. The setting is different, the plot original, and the cast of characters new. We are told the story of one day in the lives of a number of different animals, dwelling together willy-nilly in a common habitat, like the nations making up the UN. Each has its needs, desires, and fears—often conflicting with but inescapably related to those of the other members of the community. But whereas in *Beetle Rock* all the characters were, so to speak, socially acceptable to their human counterparts, in *Teton Marsh* we meet not only such bold, dramatic characters as the moose, the osprey, and the trumpeter swan, but those less distinguished brethren of the wild, the leech, the pond-snail, and the mosquito!

It is true that the rigid student of animal behavior will find statements here to which he will take exception. Miss Carrighar has tried hard and intelligently

to avoid this particular criticism. She has written, for example, of the mink, "In his flat little skull was no space for the brain tissue that functions morally.... Instinct was all the guidance he had, and adjustment to it was his kind of integrity." But she has also written on a subsequent page, "The Mink was fed, but his day had had one great disappointment—he had not caught the Hare.... The Mink never had seen snow before. He was confused...."

This, it may be argued, is not objective writing. Possibly not; but just how objective must we be? Is this in essence any different from speaking—as any of us is likely to any day—of the cheerful song of the robin or the plaintive call of the goldfinch? We do not know, and do not even really mean, that the robin is happy and the goldfinch sad. We are speaking of the impression produced on us. There may be persons who can take a completely objective view of nature, but they are not likely to become great writers, or great naturalists either.

As far as this reviewer is concerned, it matters naught what Sally Carrighar thinks about what a mink thinks, so long as she writes so beautifully and truly of what a mink does. It is the author's sensitivity to nature, her undoubted carefulness of observation, her feeling for the drama in the lives of the creatures of the wild, and her deep and continuing awareness of the indescribable beauty of one of the most magnificently beautiful places in all the world, that make this so memorable a book.

The illustrations are thoughtfully and understandingly done by George and Patricia Mattson, two San Francisco artists whose undoubted talents are here first brought to general notice. For those who are concerned about such matters, both artists work on every drawing, something quite extraordinary in its way, like having someone join you in writing alternate sentences of a book review. All we can say is that, for these illustrators, the system obviously works.

On another page of this magazine there is an article by Olaus Murie on the Jackson Hole National Monument. There is nothing, in Sally Carrighar's book, of propaganda, nothing to indicate that she even knows that a strong, well-financed lobby of cattlemen has been moving in on Washington, urging abandonment of the Jackson Hole National Monument and private exploitation of this wilderness paradise. But there are passages of *Teton Marsh* that should be required reading for every member of the Congress—such, for example, as the following:

.... The storm broke up. The mountain and the long range south took shape. The overhead thickness began to lift and shred. For awhile clouds, luminous with moonlight, continued to cross the frosted blue of the dark night sky. Their shining passage seemed the only happening, now that the earth was covered by

the wide monotony of the snow. As smoothly as swans the clouds appeared from over the Teton crest, to stream above the valley and beyond the eastern range... always they were changing, but their world did not change. It was a world of inviolate wildness."

ROBERT CUNNINGHAM MILLER

California Academy of Sciences

San Francisco

ONE HUNDRED YEARS IN YOSEMITE. By Carl Parcher Russell. University of California Press. Berkeley and Los Angeles. 1947. (Revised edition.) xviii + 226 pp. Illus. Map. \$3.75.

The word Homesickness, dictated by a long absence, begins these paragraphs on Charles Parcher Russell's centennial account—brought up to date and reprinted after fifteen years—of the discovery and subsequent relations of Yosemite Valley. The writer must believe that the living persons whose memories of Yosemite reach back to 1882 or earlier are a very small and swiftly lessening company. Our recollections differ certain ways, in color and texture, from those reflected by the picture-postcards mailed on a Sunday evening in San Francisco to tell of round trips to the Valley for lunch. It is a temptation therefore to fancy that Dr. Russell's *One Hundred Years in Yosemite* will be read most gladly by us old-timers; but the fancy vanishes immediately as one recalls that the Sierra Club now numbers six thousand members—and represents tens of other thousands who have of recent years learned well the lessons of the mountains taught them not so much by John Muir as by their own ears and eyes, their own feet and hands.

If it were cricket to do so, the reviewer would do no more than transcribe the two hundred-odd words of the dust-cover, concluding thus: "Dr. Russell was for many years the Yosemite Park Naturalist, charged with representing Yosemite to the public. He is now Chief Naturalist of the National Park Service. His long list of publications has established him as an authority in this field." Or, still better, the three hundred-fifty-odd "forewords," dated February 1947, of Newton B. Drury, Director of the National Park Service, from which we blandly lift as follows:

"Dr. Russell's *One Hundred Years in Yosemite*, appearing now in its new version, gives not only a chronology of events, and the persons taking part in them, related to this place of special beauty and meaning. It also portrays, in terms of human experience, the growth of a distinct and unique conception of land management and chronicles the thoughts and efforts of those who contributed to it. It tells of the obstacles overcome, and of the pressures, present even today, to break down the national park concept, and turn these lands to commercial and other ends that would deface

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their beauty and impair their significance. This book, therefore, is more than a history of Yosemite. It traces the evolution of an idea."

Stephen Mather's successor agrees, then, that his chief naturalist is something of a propagandist. This is true—worthily true. Mostly, Dr. Russell is straight, thoroughly readable, historian; mostly, he writes as if he knew that his readers must—having merely read him—enlist in the Sierra Legion of Honor.

We should like to add a few words from Dr. Russell's preface (a preface fine of spirit, and generous of gratitude towards the many who had helped him gather the widely scattered material, of all sorts, indispensable to his plan of writing): "The nation is yet in a pioneering stage in defining Yosemite values and regulating their use. In the light of experience of the past, it should be possible to discern some of the path that lies ahead. The ability to discern even the more subtle influences affecting the security of Yosemite and other great national parks has become a 'must' for National Park Service executives."

The book itself is another admirable example of what the University of California Press of late years is doing, both editorially and typographically. Even so, this reviewer must be ungracious enough to lay a few slips to proofreading and to wish that a few more had been blue-penciled in the manuscript. One or two curious little errors of fact, also, may be noted. For example, twice at least—evidently on the say-so of K. C. Ingram "regarding Southern Pacific records of railroad building"—Berenda is put down as having been reached by the southward-driving Central Pacific (pp. 63, 182) ahead of Merced. Berenda, main-line junction of the spur-line to Raymond, is about twenty-one miles south of Merced, in the next county, and about twelve miles north of Madera. Another bit of geographical—or potamological—confusion (for this reader) lies in the strange story of the brief Indian-trader career and death of James D. Savage, leader of the first whites known to have set foot in Yosemite Valley. Dr. Russell—no doubt correctly—puts Major Savage's most southerly trading-post on Fresno River (one of the smallest tributaries of the San Joaquin), near Coarse Gold. He quotes, however, a San Francisco newspaper story of 1852 that puts Savage's post on the San Joaquin—a day's saddle trip, probably, farther south.

Finally, the Index—9 pages—is all that an index should be. It is preceded by an admirable Bibliography—15 pages—advertised as "the most nearly complete of published bibliographies on Yosemite." This in turn is preceded by a 15-page Chronology—a most valuable feature—running from 1776 to 1947.

TRACY R. KELLEY

Berkeley, California

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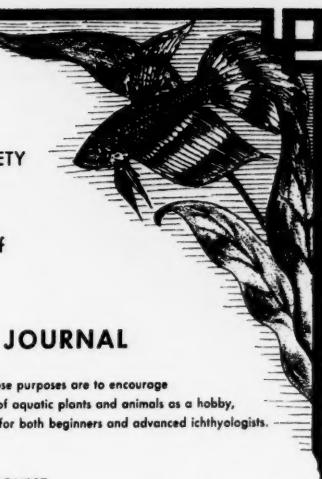
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